

What is claimed is:

1. A choke coil comprising:
5 a closing magnetic core including:
a center magnetic leg,
a outer magnetic leg, and
a common magnetic yoke, and
a coreless coil coiling a plate-type wire made of one of flat type wire and foil type wire,
10 said coreless coil being mounted to the center magnetic leg, wherein a terminal is coupled to both ends of the plate-type wire of the coreless coil and at least a terminal coupled to an inside end is led out to outside through one of a notch and an opening provided to one side of said common magnetic stool of said closing magnetic core.

15 2. The choke coil as defined in Claim 1, wherein said coreless coil is mounted on a face contacted to the closing magnetic core via an insulating layer.

20 3. The choke coil as defined in Claim 1 or Claim 2, wherein said closing magnetic core comprising: a combination of EE-shape, EI-shape and TU-shape closing magnetic cores.

4. The choke coil as defined in Claim 3, wherein said closing magnetic core comprising: a manganese ferrite core.

25 5. The choke coil as defined in Claim 1 or Claim 2, wherein said closing magnetic core comprising: a center magnetic leg including magnetic gap thereon.

6. The choke coil as defined in Claim 1 or Claim 2, wherein said closing magnetic core comprising: a center magnetic leg including magnetic gap thereon.

Sub A3

7. The choke coil as defined in Claim 1 or Claim 2, wherein said center magnetic leg of the closing magnetic core has a cross section shaped in one of a circle, an oval and an ellipse

Sub E2

8. The choke coil as defined in Claim 1 or Claim 2, wherein, on a free side of said common magnetic yoke, one of a cavity, a notch and a hole is provided at a place corresponding to the terminal situated inside of the common magnetic yoke, wherein another side of said common magnetic yoke has been provided with one of a notch and an opening.

9. The choke coil as defined in Claim 1 or Claim 2, wherein EI-shape magnetic core is
10 employed as said closing magnetic core, wherein said I-shape magnetic core has one of a notch and an opening through which said terminal coupled to the inside end of the coreless coil is led out.

10. The choke coil as defined in Claim 1 or Claim 2, wherein a thickness of a free side of said common magnetic yoke of the closing magnetic core is 65-90% that of another side where one of the notch and the opening for pulling out the terminal is provided.

11. The choke coil as defined in Claim 2, wherein said coreless coil is housed in one of a resin molded case and an insulating case.

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12. The choke coil as defined in Claim 1 or Claim 2, wherein said coreless coil comprises a self-welding flat-type insulating wire.

13. The choke coil as defined in Claim 1 or Claim 2, wherein said coreless coil is shaped in one of a circle, an oval and an ellipse responsive to a shape of said center magnetic leg of the closing magnetic core.

14. The choke coil as defined in Claim 2, wherein both ends of the plate-type wire constituting said coreless coil are bent so that each end protrudes inside and outside respectively.

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15. The choke coil as defined in Claim 1 or Claim 2, wherein a spacer is disposed between the plate-type wire and a connecting portion of the terminal coupled to each end of the coreless coil.

5 16. The choke coil as defined in Claim 12, wherein a distance between the end of the plate-type wire and the connecting portion of the terminal is slightly extended.

17. The choke coil as defined in Claim 1 or Claim 2, wherein the insulating layer formed between the coreless coil and the closing magnetic core comprises a positioning protrusion which
10 fits into one of the notch and the opening provided to the one side of the common magnetic yoke of the closing magnetic core.

18. The choke coil as defined in Claim 1 or Claim 2, wherein the insulating layer formed between the coreless coil and the closing magnetic core comprises a terminal base.

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19. The choke coil as defined in Claim 18, wherein said terminal base comprises:

a base plate, and

a cylinder located in a center of the terminal base, wherein said cylinder engages with the center magnetic leg of the closing magnetic core.

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20. The choke coil as defined in Claim 19, wherein said cylinder of the terminal base comprises:

a cylinder having thickness deviation, and

25 a guiding portion provided at a thicker part of said cylinder for engaging with the terminal of the coreless coil.

21. The choke coil as defined in Claim 20, wherein said cylinder comprises:

a fixing part provided at the thicker part of said cylinder for fixing a bent portion of the end of the coreless coil.

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22. The choke coil as defined in Claim 18, wherein said terminal base comprises:
a cylinder, and
a base plate,
wherein said cylinder and said base plate are independently built and then coupled
5 together.

23. The choke coil as defined in Claim 18, wherein said terminal base comprises:
a base plate having a support protrusion at each corner thereof.

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24. The choke coil as defined in Claim 23, wherein said support protrusions at each corner
have a taper on a face into which an outer turn of the coreless coil is inserted.

15 25. The choke coil as defined in Claim 23, wherein a part of said support protrusion of the
terminal base has a fixing part for fixing a bent portion provided at an outer turn of the coreless
coil.

20 26. The choke coil as defined in Claim 17, wherein a terminal base has the coreless coil
incorporated into said terminal base as one molding.

25 27. The choke coil as defined in Claim 1, wherein the coreless coil is molded into an EI-
shape closing magnetic core of which at least one of two edges corresponding to edges of an I-
shape magnetic core has a notch to which a terminal base is mounted, and one face of the terminal
base has a protrusion engaging with a notch of the I-shape magnetic core.

28. The choke coil as defined in Claim 2, wherein the insulating layer between the coreless
coil and the closing magnetic core comprises an insulating sheet.

29. The choke coil as defined in Claim 28, wherein said insulating sheet has an engaging part at each outside corner thereof for engaging with one of the outer magnetic leg, an insulating enclosure of the coreless coil, and a support protrusion for the insulating sheet to be positioned.

5 30. The choke coil as defined in Claim 28, wherein said insulating sheet has an opening which fits into the center magnetic leg of the closing magnetic core.

7 31. The choke coil as defined in Claim 1 or 2, wherein the terminal coupled to both ends of coreless coil employs one of a plate-type terminal and a pin-type terminal.

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32. The choke coil as defined in Claim 31, wherein said terminal is formed to fit into a guide groove on a lower face of a positioning part so formed to fit into the notch provided on the closing magnetic core, said terminal being led out to be flush with a bottom face of the choke coil.

15 33. The choke coil as defined in Claim 1 or 2, wherein said terminal comprises a portion coupled to the coreless coil, and another portion led out from a terminal base, wherein said another portion has a wider width.

20 34. The choke coil as defined in Claim 33, wherein said terminal has a taper for absorbing a width difference at a boundary part between two portions having different width.

35. The choke coil as defined in Claim 1 or 2, wherein the terminal is coupled to the coreless coil by one of ultrasonic bonding and welding.

25 36. The choke coil as defined in Claim 1 or 2, wherein the two terminals led out from a terminal base has a same mounting face when being mounted onto a substrate.

37. The choke coil as defined in Claim 1 or 2, wherein the terminal led out from a terminal base is so bent to be along a side face of a terminal base.

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38. The choke coil as defined in Claim 1 or 2, wherein an insulating plate is provided beneath a bottom face of the closing magnetic core for guiding the terminal.

cont
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B10

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E6

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F3